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Drought Update for the Week of August 23

SALT LAKE CITY (August 25, 2021) – August rains have created a spike in soil moisture and reduced outdoor watering demand. As a result, reservoir levels stayed steady this past week. Soil moisture is critical to efficient spring snow runoff. Last season record-dry soils soaked up snowmelt, which never filled reservoirs.

The [U.S. Drought Monitor](#) is reflecting a slight improvement in drought conditions, with 98.75% now in “extreme” or “exceptional” drought compared to 99.43% last week. This time last year, drought was starting to worsen with 24% in “extreme” drought, with nowhere in the “exceptional” drought category.

“We have been fortunate over the last month to receive significant precipitation that has increased streamflows and soil moisture. If we can maintain wetter soils heading into the winter months, it improves our situation next spring,” said Utah Department of Natural Resources Executive Director Brian Steed. “It will take time and the right conditions to rebuild the storage we have been using this summer.”

The following [drought](#) impacts from the week of Aug. 23 are compiled by the Utah Divisions of [Water Resources](#), [Water Rights](#), [Wildlife Resources](#), [State Parks](#), the [Department of Environmental Quality](#) and the [Department of Agriculture & Food](#).

At-a-glance changes for the week:

- Thirty-one of Utah’s largest 42 reservoirs are below 55% of available capacity (33 last week). (Utah Lake and Smith & Morehouse increased slightly to above 55%.) Overall statewide storage is 51% of capacity, the same as last week.
- Of the 98 measured streams, 31 flowed below normal this week compared to 65 last week because of heavy rain.
- Blackridge Reservoir in Herriman and Whitney Reservoir in the Uinta-Wasatch National Forest have Warning Advisories for harmful algal blooms. Pineview Reservoir also has a Warning Advisory for waterborne pathogens due to E. coli. [Here’s what recreators can do](#) to keep themselves safe from waterborne pathogens.



- Several years of ongoing drought conditions and the extreme drought this summer have impacted the populations of upland game species across the state, including doves, pigeons, grouse, partridge and rabbits. [Here's what hunters should expect](#) during this fall's hunts.
- Boat ramp closures remain the same as last week, with 11 closures at nine state parks, including Jordanelle, Antelope Island, Echo, Hyrum, Millsite, Piute, Rockport, Willard Bay and Yuba. Caution advisories have also been issued for seven additional state park boat ramps. View conditions [here](#).
- The Town of Scofield's water tank is now dry due to overuse and low spring flows. The Division of Drinking Water has issued an emergency permit for the town to haul water for residents as a short-term solution and will work with the town on long-term water management strategies including infrastructure needs like new well meters.
- Due to drought conditions, the move of cattle and sheep from pasture has begun earlier than typical, leading to additional economic stress on producers who must instead rely on hay rather than rangeland forage for animal feed.
- Hay continues to be in high demand and at higher than normal prices with and roughage supplies are rated at 92% short or very short and prices approximately double those of last year.
- Irrigation water supplies are rated as 84% short or very short
- Pasture and rangeland conditions improved slightly after recent rains and are rated as 63% short or very short compared to 70% short or very short as of last week.

(Information gathered from [USDA's Crop Progress and Condition Weekly Report](#))

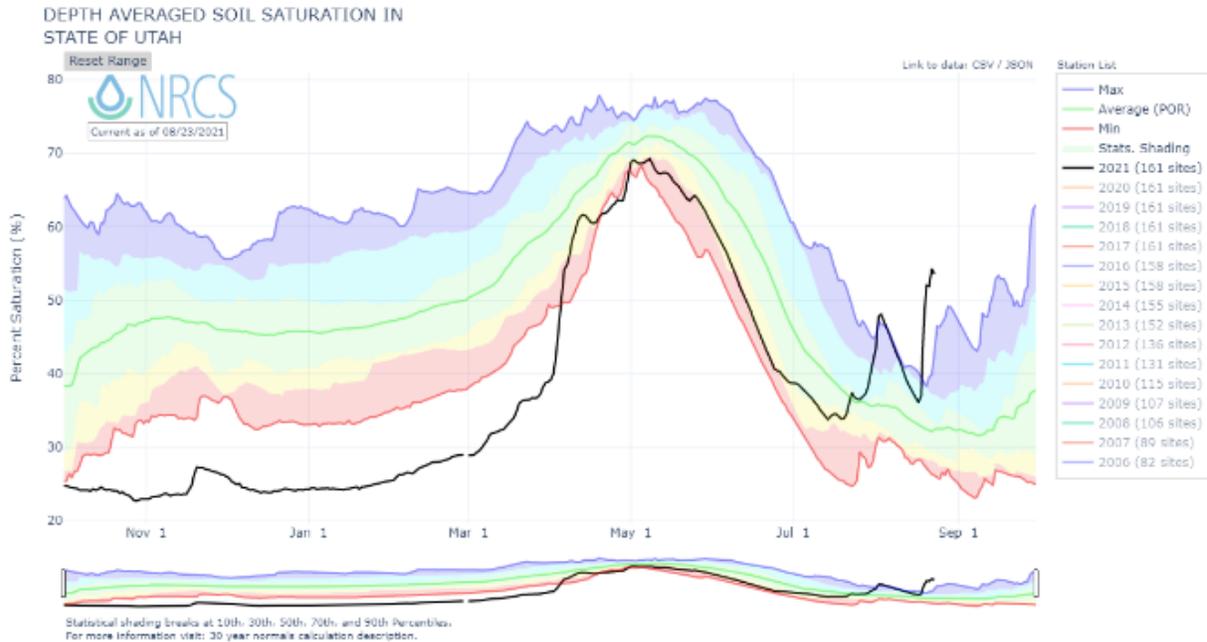
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FULL REPORT: WEEK OF AUGUST 23

Precipitation and soil moisture

- Precipitation accumulation (as measured at NRCS SNOTEL sites) continues to be well below average. To restore conditions to "average" for the year, Utah still needs about 8.5 inches of rain: 6 inches to cancel the deficit and 2.5 inches to account for the precipitation traditionally accumulated from mid-August through September.
- Overall (mountain and valley locations), the state has seen 75.3% of the precipitation typically received in a normal water year (Oct. 1 through Sept. 30). Much of that precipitation is from heavy rains late in the year which is less beneficial for collection and storage. Reservoirs are typically designed to collect high mountain snowmelt. Rainfall often occurs at an elevation too low to collect or may contain too much sediment and debris to be beneficial for filling reservoirs. Rainfall is essential to increasing the soil moisture and helps to reduce the demand as people shut off their sprinklers.
- To get streams running at healthy levels while filling reservoirs, Utah needs late summer and early fall storms to return soil moisture levels to normal, which will help snowpack runoff make it to streams and reservoirs rather than get absorbed by dry soils. The state also needs an above-average snowpack to refill reservoirs.
- Air temperatures for the week were 0.6 degrees Fahrenheit below average.

- Soil already fairly wet from previous storms increased in soil moisture to record wet and is 21.2% above average (3.4% last week) for this water year. Wet soils are critical in the fall as the state begins to accumulate its winter snowpack. As seen in the chart below, significant increases and decreases in soil moisture are typical for late summer.

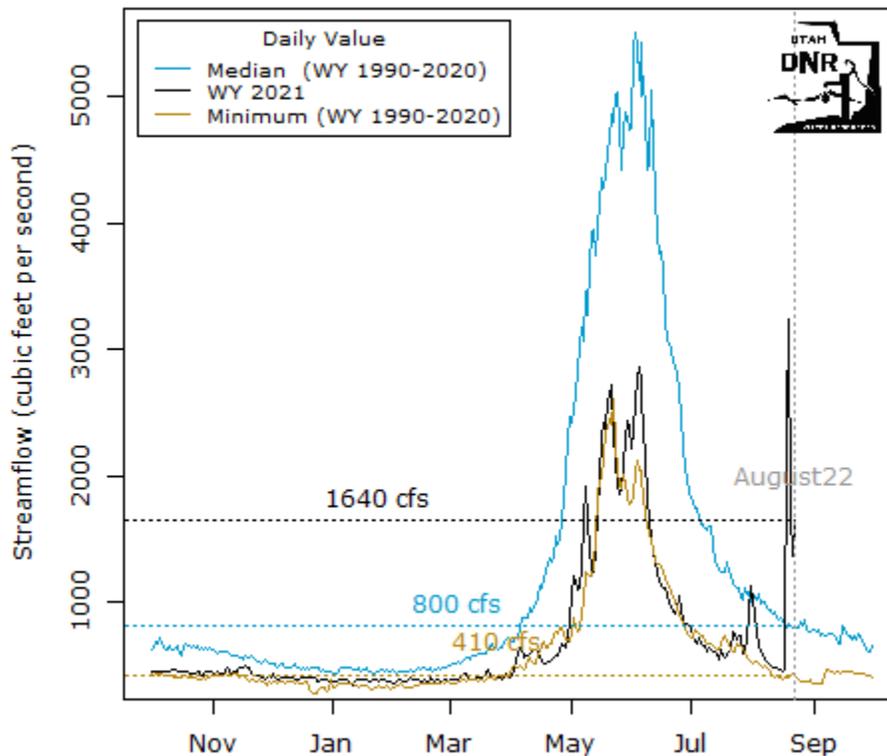


Recent rainstorms are reflected as a significant increase in soil moisture followed by a significant decline in the state soil moisture sensors (found at mountain [SnoTel sites](#)). Healthy soil moisture levels allow snowpack runoff to enter the streams and reservoirs rather than get absorbed by dry soils. Monsoonal patterns never occurred the last two years, leading to record dry soils in October 2020 and throughout the winter (reflected in the graph above).

Streamflows

- Cumulative flow of 28 headwater streams continues to flow at about 50% of normal.
- Thirty-one (65 reported last week) of Utah’s 98 streams reporting data are flowing below normal, which is roughly half of the previous week.
- Two streams are flowing at their lowest levels ever recorded, two less than last week.
- Daily flow from 28 headwater streams has seen a sharp spike due to recent rain. It is currently flowing above the typical daily flow record but is expected to continue to fall to closer to low flows for this time of year.

Daily Flow from 28 Headwater Streams



Flows for 28 headwater streams were added together to show how Utah's water supply is being affected. This chart shows the Water Year (WY) from October to September as compared to the median and minimum values (1990-2020). Significant increases from recent storms can be seen. Unfortunately, a few days of high flows don't make up for over a year of near-record low flows.

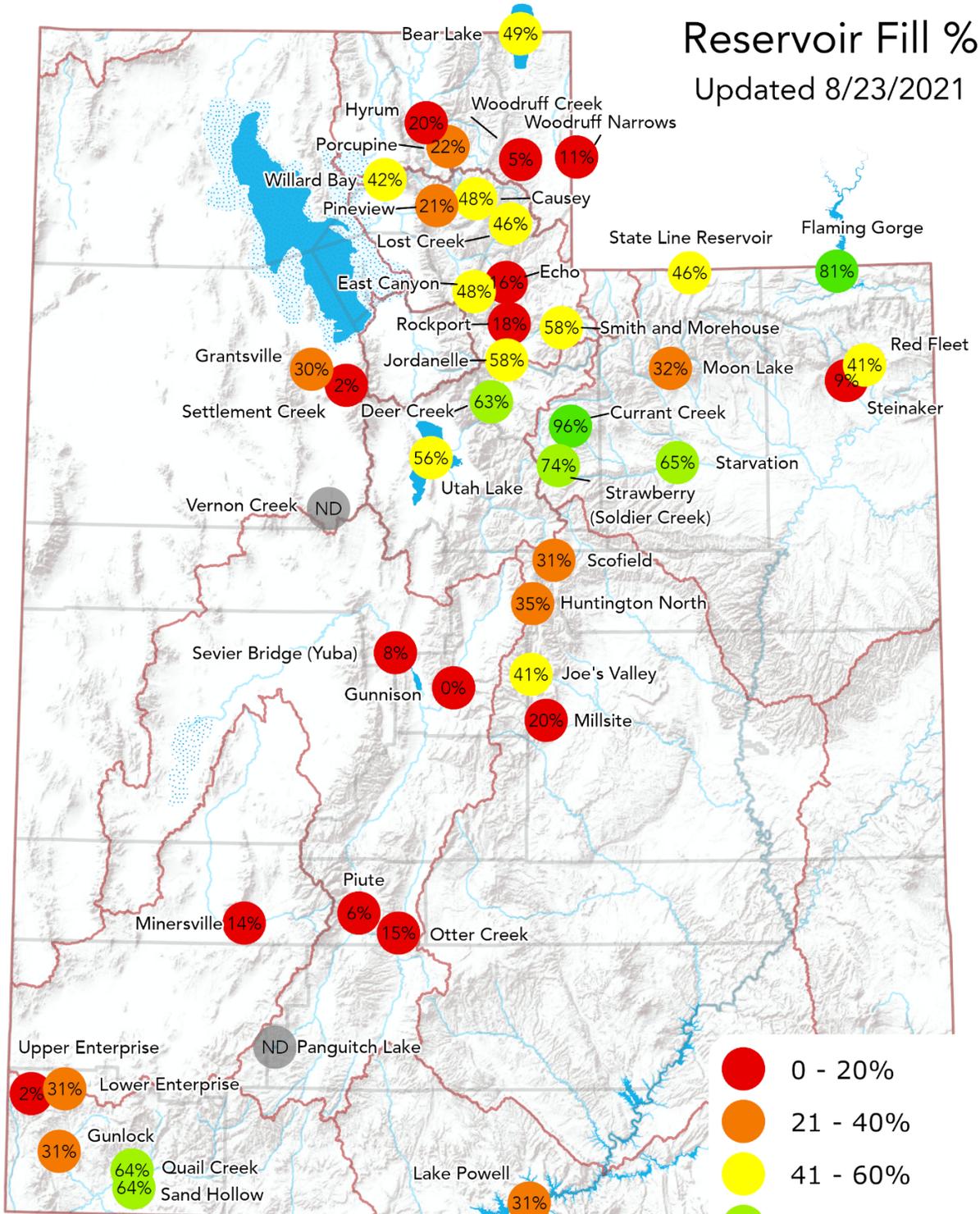
Reservoir and Lake Levels

About 95% of Utah's water comes from snowpack. This statewide average ranges from around 75% in the southwest corner to over 95% in the northern part near the Weber Basin headwaters. Different-sized reservoirs are located throughout the state to catch and store runoff. Small reservoirs store about one year's worth of water, while larger reservoirs, like Strawberry or Jordanelle, store several year's worth. Reservoir storage helps to prevent water shortages and is dependent on snowpack and runoff.

- The capacity of major reservoirs statewide remained steady at 51%.
- Thirty-one of Utah's largest 42 reservoirs are below 55% of available capacity (33 last week with Utah Lake and Smith & Morehouse increasing slightly to above 55%).
- The Great Salt Lake's elevation remained steady at 4191.0, about 4.8 inches below the record low.

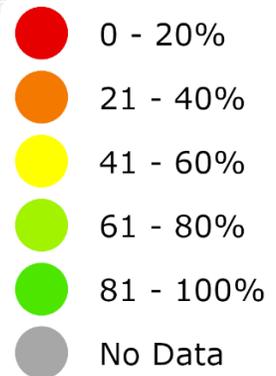
Reservoir Fill %

Updated 8/23/2021



Data Sources

Bureau of Reclamation, Bear River Commission,
 Emery Water Conservancy District,
 Sevier River Water Users Association,
 Washington County Water Conservancy District



Drought Effects on Priority Distribution of Water Rights in Utah (updated Aug. 24)

Water rights are distributed by the state engineer with priority going to the earliest rights. For example, a water right established in 1889 is entitled to receive its full flow before water rights established in 1890 or later can receive any water. This principle is called the “Prior Appropriation Doctrine” or “first in time, first in right.” The earliest water rights in Utah are called “direct flow” rights, meaning they cannot be stored. Storage reservoirs were built later on, so storage rights generally have priority dates later than direct flow rights. However, some “high” water rights (direct flow rights with late priority dates) exist.

While public water suppliers own some water rights, others are held by individuals like farmers and ranchers. Priority distribution happens every year, not just during droughts, and occurs irrespective of the type of use. Most water rights are fully or partially curtailed by mid-summer when the natural flow of a stream drops following spring runoff. The term “natural flow” refers to the total supply of a stream, which is generally different from the flow of the stream at any particular point.

Natural flow on complex systems is determined using accounting models developed by the Division of Water Rights. Water can be stored on the system when the natural flow is greater than 100% of the direct flow rights. When the natural flow drops below 100% of the direct flow rights, these rights are reduced according to priority date. Storage, if available, can be released to make up all or part of the deficit. The amount of storage available on each system is a function of the specific projects developed on the system over the last hundred-plus years. This year has seen an early decrease in natural flow because of very little spring runoff. In previous years systems were generally storing water in mid-June, sometimes in considerable amounts, while 2021 is already seeing some of the earliest water rights being curtailed.

While statewide, there are many different river systems, the information below highlights water rights priorities, natural flow and direct flow on just four of them. CFS below stands for cubic feet per second.

Middle Bear River – Priorities: Direct Flow (1860 - 1909), Storage (1911), High Rights (1914 - 1989)

<i>Date</i>	<i>Priority from River</i>	<i>Natural Flow</i>	<i>% Direct Flow Rights</i>
Aug 19, 2019	1901	875 cfs	63%
Aug 19, 2020	1897	619 cfs	44%
Aug 19, 2021	1889	358 cfs	26%

- The water supply on the Logan River, tributary to the Middle Bear, is third lowest on record out of 58 years (1977 and 1992 were lower) according to the CRBFC Water Supply Forecast (Station LGNU1).
- Currently, only 26% of the direct flow water rights are being met with earliest priority rights being fulfilled from 1860 to 1889.

Upper Provo River – Priorities: Direct Flow (1st Class - 17th Class), Storage

<i>Date</i>	<i>Priority from River</i>	<i>Natural Flow</i>	<i>% Direct Flow Rights</i>
Aug 24, 2019	60% 1 st Class	94 cfs	21%
Aug 24, 2020	30% 1 st Class	47 cfs	10%
Aug 24, 2021	16 th Class	304 cfs	67%

- The water supply on the Provo River at Hailstone is the third lowest on record out of 67 years (1977 and 1961 were lower) according to the CRBFC Water Supply Forecast (Station PVHU1).

- Currently, 67% of the direct flow water rights are being met, consisting of 1st through 16th Class rights.

Upper Duchesne River – Priorities: Direct Flow (1900 - 1964), Storage (1964)

Date	Priority from River	Natural Flow	% Direct Flow Rights
Aug 23, 2019	Storage	406 cfs	37%
Aug 23, 2020	1910	186 cfs	17%
Aug 23, 2021	Storage	706 cfs	64%

- The water supply on the Duchesne River at Randlett is the second lowest on record out of 79 years (1977 was lower) according to the CRBFC Water Supply Forecast (Station DURU1).
- Currently, 64% of the direct flow water rights are being met with the earliest priority rights being fulfilled from 1900-1964.

Upper Sevier River – Priorities: Direct Flow (1st Class – 3rd Class), Storage

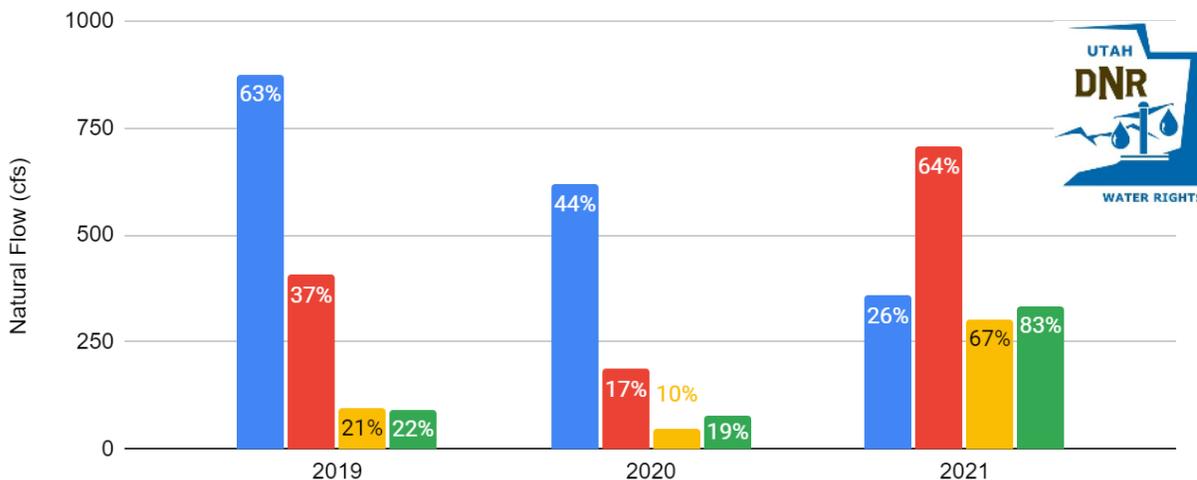
Date	Priority from River	Natural Flow	% Direct Flow Rights
Aug 23, 2019	31% 1 st Class	90 cfs	22%
Aug 23, 2020	25% 1 st Class	76 cfs	19%
Aug 23, 2021	55% 2 nd Class	335 cfs	83%

- The water supply on Salina Creek is the 3rd lowest on record out of 58 years (1977 and 2018 were lower) according to the CRBFC Water Supply Forecast (Station SAYU1).
- Currently, 83% of the direct flow water rights are being met, consisting of 1st Class rights and 55% of 2nd Class Rights.

Natural Flow Distribution on Four River Systems (Aug 24)

Percent Values Greater than 100 Indicate Water Being Stored

- Middle Bear (Direct Flow Water Rights = 1392 cfs)
- Upper Duchesne (Direct Flow Water Rights = 1109 cfs)
- Upper Provo (Direct Flow Water Rights = 454 cfs)
- Upper Sevier (Direct flow Water Rights = 406 cfs)



Well Replacements

In addition to surface water rights, the state engineer oversees groundwater appropriation and construction of groundwater wells. As groundwater conditions change, well owners may need to replace their well. This may be due to issues with the existing well or the need to drill deeper. When this happens, a water user files either a replacement or renovate application. In some

cases, a change application may need to be filed. This is dependent on the individual status of the user's water right.

- Five new well-replacement applications were filed in the last week. The total number of replacement and deepening requests this year is 103 statewide.
- As a comparison, there were 113 in 2020 and 102 in 2019. The average annual count during the past five years is 107.